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PUBLIC SCHOOL HEALTH BULLETIN

NUMBER 1

EYES AND EARS

ISSUED FROM OFFICE
SUPERINTENDENT OF PUBLIC INSTRUCTION OF NORTH CAROLINA
RALEIGH, 1910

PUBLIC SCHOOL HEALTH BULLETIN

NUMBER 1

(SECOND EDITION)

EYES AND EARS

PREPARED BY
W. S. RANKIN, M.D.
SECRETARY STATE BOARD OF HEALTH

ISSUED FROM OFFICE
SUPERINTENDENT PUBLIC INSTRUCTION OF NORTH CAROLINA
RALEIGH, 1910

EDWARDS & BROUGHTON PRINTING CO., RALEIGH, N. C.

INTRODUCTORY LETTER OF STATE SUPERINTENDENT OF PUBLIC INSTRUCTION.

To Public School Teachers:

This is the first of a series of bulletins on public health and sanitation, prepared by the Secretary of the State Board of Health, at the request of the State Superintendent of Public Instruction, for distribution to the public-school teachers. Other bulletins will follow.

Every teacher is earnestly urged to read carefully every line of this bulletin, and to observe the simple, practical suggestions contained herein. Every county superintendent is urged to insist upon the observance of these suggestions by every teacher and school committee. The first duty of every teacher and every school official is to protect the health and the lives of the children committed to their care by providing for them healthful surroundings in schoolroom and on school grounds. Your careful attention to these simple suggestions will result in adding to the comfort and pleasure of your pupils, in improving the discipline, in stimulating intellectual effort and study, and may result in preventing much suffering and in saving human lives.

In matters of hygiene and sanitation, example is better than precept, and the teaching of daily surroundings more effective than the memorizing from books of hygienic rules and laws.

Simple, brief health talks should be given to all the children of the school by every teacher once or twice every week. This and the bulletins following it will contain helpful information needed for such talks.

The examination on Physiology and Hygiene required for teachers' certificates will hereafter comprehend all subjects contained in these health bulletins. Examination questions on these will probably be prepared and sent out from the office of the State Superintendent of Public Instruction. Teachers are, therefore, expected and required to acquaint themselves thoroughly with the contents of these bulletins.

Very truly yours,

J. Y. JOYNER,

Superintendent of Public Instruction.

RALEIGH, November 20, 1909.

TEACHER'S CARE OF THE CHILD.

THE OBLIGATION OF THE TEACHER TO EXAMINE THE EYES AND EARS.

The examination of school children with reference to the relation of the condition of their eyes, ears, and throat to their mental efficiency has now proceeded far enough to justify the following conclusions:

First. A considerable part of the dullness, truancy, and backwardness of childhood, and the nervous breakdowns occurring in later life, preceded or not preceded by the above defects of childhood, are due not to defective minds, but to the existence of some easily detected disease of the eyes, ears, or throat.

Second. That many children have their dispositions ruined by being scowled at and punished by parents and teachers, and ridiculed by schoolmates, when their only trouble is some removable physical defect.

Third. That the test necessary for the detection of these defects may be made by any accurate person who can read. The Massachusetts State Board of Health, after two years' application of these tests by the public school teachers of this State, say *that the tests made by the teachers were not less efficient than those made by specialists.*

Fourth. That it is the duty of teachers to apply these simple tests, before some serious injury to the child's disposition or nervous system results.

INTRODUCTION.

THE LARGER EDUCATION.

A more comprehensive view of the purpose of education is rapidly taking hold of teachers. The old, narrow, short-sighted idea of education that concerned itself with but a part of the child—its mind—is fast giving place to an education that seeks the development of the *whole* child—mind, soul, and body. In this broader education the teacher will add to the work of instruction the more important duty of child-study. As the child studies the book, so will the teacher study the child.

This enlargement of the scope of education is the outcome of two factors: First, we have a sounder conception of the unity, the inseparableness, of mind and body. We have learned this lesson at the expense of converting Americans into the most nervous people in the world. Second, the old idea, still extensively held, that diseases are foreordained, inevitable, has been shown by the extensive researches of the last quarter of a century to be incorrect. We now know that many diseases are preventable, and that, unprevented, they set aside for naught much of the work of preparation, the work of the first two decades. How foolish, then, for teachers to continue to concern themselves solely with the child's mind, developing it symmetrically, and how short-sighted of teachers to fail to teach the child Nature's first commandment, self-protection, that is, the very simple means of disease prevention! How often is the completed work of the teacher—the long hard hours—marked zero by the untimely finger of the grim reaper! How much more valuable to many poor victims of tuberculosis, typhoid or some other preventable disease, would a half hour's talk on the prevention of these diseases have been than all the teacher's well-meaning efforts!

Some months ago a strong, healthy young man graduated with the Doctor of Philosophy's degree from one of the best-known universities of our country. Some years before he had graduated with honors from our State University. He had held an important chair in one of the larger colleges of the State and from every point of view, strong physically, and with the best mental training to be had in this country, he stood on the threshold of what seemed to be a brilliant and useful career. One month after graduation, in a canoe with several friends and within fifteen feet of the shore he was capsized, and having never been taught to swim, drowned. And in this way was set aside an education that cost at least $5,000 and twenty years self-sacrificing effort, not to mention the work of the centuries—the man. And all for the lack of one-half hour in a swimming pool—a half hour that would have been worth more to him than his entire college course.

Beginning with the distribution of this bulletin, "School Bulletin, No. 1," the State Board of Education, conjointly with the State Board of Health, will undertake to educate the teachers, and through the teachers the children, and through the children the homes, in regard to the care of so fundamental a matter as their health.

This bulletin deals with the teacher's care of the child; considering first the surroundings of the child, and second the child itself, especially its eyes and ears. It is a pleasure to acknowledge our indebtedness to former Secretary, Dr. R. H. Lewis, for the major part of this bulletin.

THE CHILD'S SURROUNDINGS.

THE SCHOOLHOUSE.

LOCATION.

The schoolhouse should always be located on an elevation, so that its immediate vicinity is perfectly drained. A slight rise in the ground can generally be found in the flattest section; if not, the site should be carefully drained. A certain amount of shade is desirable, but not too much. Sunshine is essential to health. There should be no trees within 75 feet of the side from which the light comes. The location should be as attractive in appearance as is possible.

APPROACHES.

The roads on general principles ought to be good, but in their relation to the schools all roads leading thereto should have at least a good, dry footpath, as most of the children walk, and every foot-log over a stream, no matter how small, in the hill country at least, should have a hand-rail. Among the tens of thousands of children attending the rural schools, an appreciable number, we have no doubt, lose their lives every year directly or indirectly from sitting with wet feet. Two children were drowned in our immediate neighborhood a year ago crossing an unguarded foot-log during a freshet in what was ordinarily a tiny brook.

CONSTRUCTION OF SCHOOLHOUSE.

One of the crying needs in our situation is better and more attractive schoolhouses, and in order to assist to some extent in supplying this need, we present plans for houses of one, two and three rooms, the last named being intended to meet the movement towards concentrating the schools which has recently been inaugurated. These plans, which we cordially commend, were prepared at our request by the well-known architects, Messrs. Barrett & Thomson, of Raleigh, and offered by them as a contribution to the general cause. If desired, in the interest of economy, they can be modified without essential alteration. From the hygienic point of view the two main features to be considered in the construction of the schoolroom are the lighting and the ventilation—the former for the protection of the eyes and the latter of the general health of the pupils.

SHAPE.

"It should be oblong, the width being to the length about as three to four, with the teacher's platform at one end."—*Sanitarian, October, 1885.*

SIZE.

"For primary or grammar school, with register of 54 pupils and attendance of about 50, the room should be about 33 feet long, 25 wide, and 13 high, which gives practically upward of 200 cubic feet of air and 16½ square feet of floor space to each pupil."—*Sanitarian, October, 1885.*

LIGHTING.

The danger to the eyes of school children is the production of near-sightedness, due to an elongation of the eyeball backward, and insufficient light is the most potent cause. We beg to quote an extract on this subject from an article on the Care of the Eyes and Ears, prepared by Dr. R. H. Lewis for the Board of Health at the request of its Secretary at that time, the lamented Dr. Wood:

"It is now regarded as an established fact that the continued tension of the muscles of adjustment (accommodation and convergence) is the principal factor in the production of near-sight; and, as the nearer the object to the eyes the greater the tension or strain upon both these sets of muscles is, it follows that everything having a tendency to cause the undue approximation of objects on which the eyes are continuously used during childhood assists in the origination of this condition. I say 'in childhood,' because it nearly always begins during that period; and it does so for the reason that the tissues of all growing and immature animals are more soft and yielding than when they have attained the firmness of maturity—another reason for special attention to their general health at this time.

"Since a large part of childhood, and particularly that part of it in which the eyes are used most on near objects, is passed in the schoolroom, it is there that we would naturally seek the causes of this trouble. And it is there that they are generally found. School children are often compelled to hold their books too near—that is, nearer than ten inches—because the amount of light is insufficient. This question of plenty of light of good quality (the best is direct from a northern sky) in the schoolroom is of the highest importance, and can not be impressed too deeply upon those having such matters in charge. In a general way, it may be said that there should always be enough light to enable a child to read on a moderately clear day fine print in the darkest corner of the room at the distance of a foot. And the direction from which it comes is also important. Preferably it should come from the left and above, so that, while illuminating the page, it may not fall upon the eyes nor cast a shadow of the hand in writing. The next best direction is from behind, then from the right, but never from in front. The children should always look at a dead wall." The requirements necessary for such a light are:

"Four windows on the left of the pupils as they sit, the tops being square and not more than six inches from the ceiling, the bottoms being at least three and a half feet from the floor, equally spaced, not grouped, with transom sashes hung at the base above the sliding sashes. A window or two in addition at the back is admissible. The size of the windows on the side, taken collectively, should equal at least one-sixth of the floor space. The highest authorities in school hygiene require 300 or 350 square inches of glass for each pupil.

"(4) On the side opposite the windows two doors, with transom windows above hung at the base, and between these transom windows, and on the same line, two more windows of the same kind and hung in the same manner.

"(5) The walls should be slightly tinted, but not the ceiling.

"(6) A blackboard may be between the doors, but a sliding blackboard back of the teacher's platform, or a portable one on the platform, in accordance with the German idea, would perhaps be better than the profusion of wall blackboard now in vogue among us."—*Sanitarian, October, 1885.*

LOCATION OF SEATS.

"The main rule to be observed in the placing of the seats is to carry them as far as possible toward the window side of the room, as far as possible from the opposite side; the aim being to make the arrangement such that the distance of the outer row of desks from the windows shall not exceed once and a half the height of the top of the window from the floor.

"Proper height of seats and desks for different ages, as approved by the Boards of Health of New York and Chicago:

"From 7 to 9 years, top of desk 23 inches, front of seat 12¼ inches.

"From 9 to 11 years, top of desk 24 inches, front of seat 12¾ inches.

"From 12 to 14 years, top of desk 25¾ inches, front of seat 14 inches.

"From 15 to 18 years, top of desk 27½ inches, front of seat 15¼ inches."

VENTILATION AND HEATING.

An abundance of pure fresh air is of the greatest importance to the growing child. To secure this without draughts is the problem to be solved. The ideal solution for the country schoolhouse is obtained by the use of a jacketed stove and a ventilating flue in the same stack with the smoke-flue having an opening at the floor. The fresh air, conducted from outside by a tin pipe or wooden box, is introduced into the room through a hole in the floor immediately under the stove. The air as it passes between the hot stove and the jacket, which goes down to the floor all around and envelopes the stove quite closely, is warmed and poured into the room at the top. The increase in the air-pressure resulting therefrom forces the foul air out through the opening of the ventilating flue, which should be one foot from the floor and on the same side of the room as the stove. The outflow of foul air is increased if the ventilating flue is warmed by the smoke-flue, which should be separated from the ventilating flue by the thinnest partition possible. By this method there is secured a diffusion throughout the whole room of pure warm air, and the pressure not only forces the cold foul air which lies on the floor through the ventilating flue, but also by seeking an exit in every direction stops the draughts through the cracks around the windows and doors—the cause of many catarrhal troubles. Another advantage in this method is that the heat is evenly distributed to all the pupils, instead of scorching those nearest the stove while those farthest off are suffering with cold. If this arrangement is unattainable, the room can be ventilated by letting down a little way the transoms at the top of the windows which are hinged at the bottom, so that the entering cold air, deflected upward against the ceiling, is "sprinkled" uniformly through the room instead of pouring on the children in a solid stream. The same effect can be obtained with ordinary windows by raising the lower sash a few inches and placing thereunder a board cut to fit.

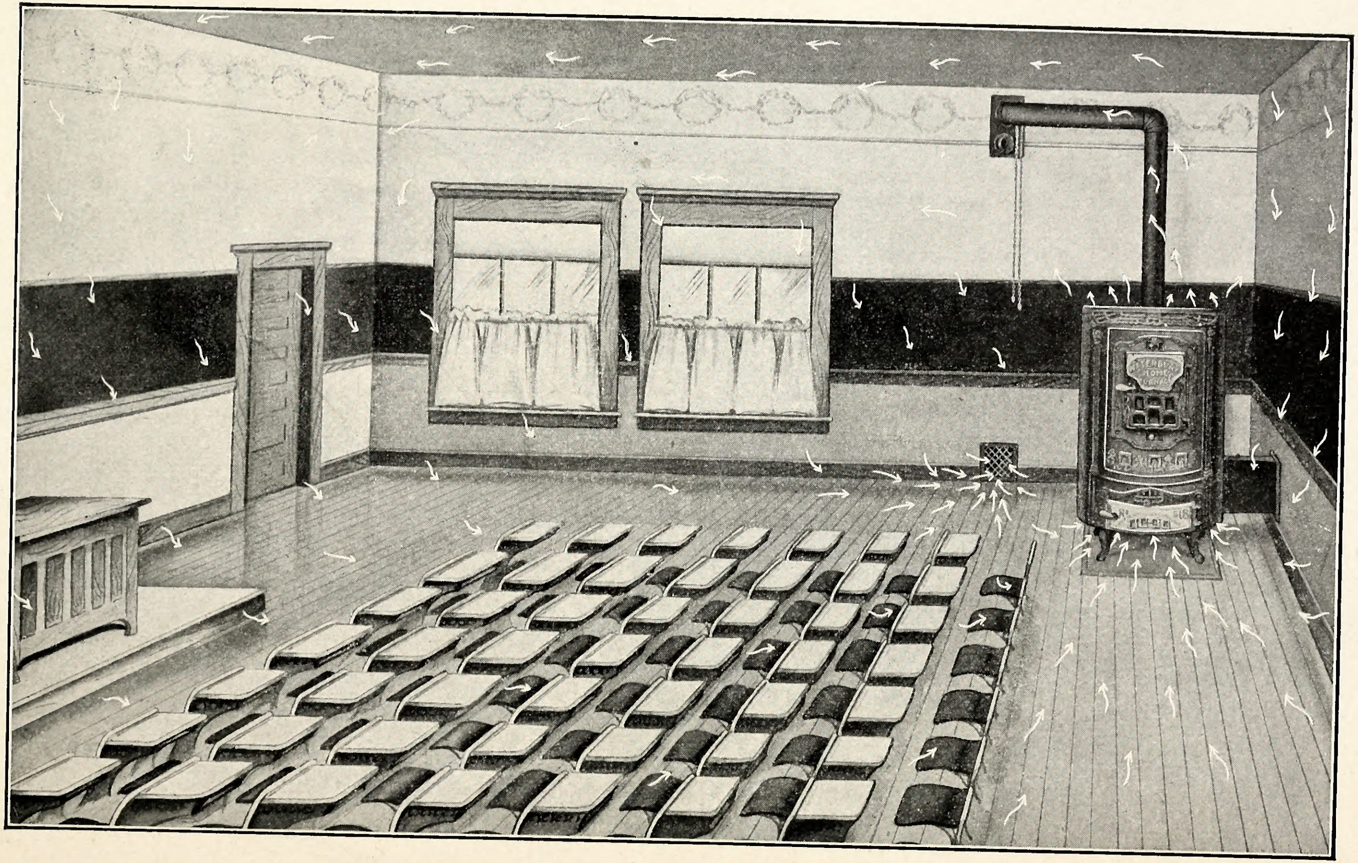
Heating is intimately associated with ventilation. The temperature should be kept as even as possible, between 68 and 70 degrees. A temperature much higher than that is debilitating to both mind and body and makes the children tender and more susceptible to colds. There should be a thermometer in every schoolroom.

[A recent improvement on the above stove is one with an asbestos jacket, which communicates through a large pipe with the outside air. The advantage possessed by this stove over the ordinary jacketed stove is less radiation from the jacket, and therefore a more uniform heating of the room. A purer air is also obtained by taking it some distance from the ground instead of beneath the house. This stove costs a little more than the one with the sheet-iron jacket, but where it can be afforded it is probably well worth the difference.]

The air-duct outside opens through the floor under stove. The air-duct should have its outer end bent up at a right angle and should be provided with a valve to regulate the inflow when, owing to a very low temperature or a high wind blowing into its mouth, the air passes through the stove insufficiently warmed. The fresh air is warmed as it passes between the hot cast-iron stove and its sheet-iron envelope or "jacket," and passing out of the top, is distributed through the room, forcing the foul air out of the ventilating flue adjoining the smoke flue with opening at floor. This vent flue should be at least 12 x 12 inches.

WATER SUPPLY.

Pure water, pure air and good food constitute the tripod upon which good health rests. It is very important, therefore, that every means should be taken to prevent the contamination of the well or spring.



The Waterbury Home Heater, Approved for use in Public Schools of North Carolina. Waterman-Waterbury Co., Buffalo, N. Y.

The earth around the well should be graded so that the surface water may run away from and not towards the well. The open well with bucket is not so safe as a pump, because of the danger of infecting the water by handling the bucket. It staggers the imagination to conceive of anything more unsanitary than the hand of a natural healthy boy. No accumulation of filth should be permitted within a hundred feet of the well or above the level of the spring.

SANITARY CONVENIENCES.

Such sanitary conveniences as are feasible should always be provided, not only in the interest of health, but of decency and civilization. A clean and comfortable privy is a long step in civilization to those whose habits are near akin to those of the wild animals of the forest. They should be located for the two sexes in different directions from the schoolhouse and screened with shrubbery or vines. They should be provided with a box of dry earth and a scoop or a shingle, and each evacuation should be immediately covered with the dry earth. They should be cleaned out every Saturday. The use of tubs would facilitate this.

RECREATION AND EXERCISE.

To the growing child active exercise in the open air is all-important. The draught should be put on and the vital fires stirred and made to burn brightly. Children ought to run and shout, thereby developing both heart and lungs. Outdoor games should be encouraged. Mere exercise, work, is good, but to obtain the best results the recreation feature must be added—the exercise must be interesting and enjoyable. A good playground should therefore always be provided and it ought to contain a ball field. We venture to say that the expenditure by the committee of a very few dollars for the amusement of the children would increase both enrollment and attendance. Many a parent would send his child to school if he was anxious to go, when otherwise he would not.

GENERAL REMARKS.

The teacher ought to realize her responsibility to the children in the matters pertaining to their health. In addition to having the principles above set forth observed as well as possible, she should see to it that the law in regard to infectious diseases is obeyed at least in so far as attendance from infected households is concerned. A child with sore throat, particularly if the least feverish, should be sent home, there to remain until it has passed off or he brings a certificate from the family physician as to its innocency. By taking this precaution the spread of diphtheria and scarlet fever may often be prevented. In rainy weather the teacher should see that wet feet and damp garments are well dried before sending children to their seats. In a word, a judicious mixture of the mother with the pedagogue would often make for health.

ADENOIDS.

They are composed of what we call lymphoid tissue, the principal function of which is to act as a filter or sieve to catch invading germs. Its structure is admirably adapted to its function; it consists of only two parts; small, very small, threads or fibers of tissue running in all directions and interlacing so as to form a structure like nothing so much as a spider's web. In the meshes of this web is the second part, namely, millions of very small, round cells. Into this mesh work of fibers and cells the fluid known as lymph is poured, and the lymph is the fluid that has exuded from the blood vessels into the tissues which it has nourished and is being returned to the veins. However, in nourishing the tissues the lymph takes up the waste products of the tissue cells and any germs that happen to be in the tissues. It is, therefore, important that before this fluid, the lymph, be poured into the veins, thence into the heart, and then sent to all parts of the body, that it be filtered; and so it is passed through this lymphoid filter, where any germs it may carry are inmeshed in the fibers and destroyed by the little round cells.

Nature has wisely placed this filter tissue in those situations where filtration of the lymph is most needed, that is, in those places where germs are most abundant and most likely to gain entrance into the tissues or flesh. Hence, we find large accumulations of lymphoid masses, lymph glands, in the armpits, where they guard the body against the entrance of germs that get into the flesh of the upper extremity; we find many of these lymph glands in the groins, guarding the body against infection from the lower extremity; the intestine is full of germs, and the intestinal tube has an abundance of this filter tissue in its walls; and so, in proportion to the exposure of any locality of the body to infection, do we find lymphoid tissue in varying amounts. Again, as the child has had less training in fighting germs than the adult, and is more prone to disease than the adult, less able to protect itself, so it needs relatively more of this lymphoid tissue than the adult; and it is a fact that lymphoid tissue is relatively more abundant under twelve than after that age, when, not needed so much, it undergoes considerable shrinkage.

Now, of all places exposed to infection or germs, the tube through which we consume our gaseous food, the tube through which we breathe, is most exposed. Unlike the tube through which we take our liquid and solid food, it is in constant use. In breathing air of average purity we inhale about 25,000 germs per minute; most of these germs are, fortunately, harmless. Through this portal enter the germs causing tuberculosis, pneumonia, scarlet fever, measles, whooping-cough and other diseases. Tuberculosis and pneumonia, the two greatest causes of death, kill 300,000 people a year, one-fifth of the entire death date of the United States. The most exposed portion of this most exposed tube is an angle in the tube just back of the nose where the horizontal or nasal part of the tube joins the vertical or pharyngeal part of the tube. Now, dust and germs tend, by the laws of gravity, to lodge in this angle of the breathing tube. And Nature, following the rule of providing most of this lymphoid or filter tissue where exposure is greatest, has abundantly supplied the roof of the throat which is at the back of the nose, that is, the angle of the breathing tube, with this tissue.

With these two factors, a large amount of soft, spongy tissue and constant and comparatively severe exposure to irritation, we may be on our guard for trouble in the pharyngeal vault. As long as the lymphoid tissue can take care of the germs gaining entrance, there is no trouble. But in about 10 per cent of children this becomes impossible, and these lymphoid masses swell. If the trouble is soon removed, the swelling subsides and no permanent damage results. On the other hand, should the irritation be unusual in amount or of long duration, a permanent enlargement, varying in size from a hazelnut to a hen's egg, results; and this is what we call adenoids. These enlarged masses of tissue are lobulated, soft, and feel to a finger pushed into the throat like a mass of earth worms, bleed very easily, and are covered over with a layer of thick mucus which is often mixed with pus or matter.

EFFECTS OF ADENOIDS.

The first effect of this nasal obstruction, naturally, is to interfere with the breathing. The child is obliged to have air, and, being unable to get it through the nose, becomes a "mouth breather." If the post-nasal obstruction is not too great, the child during waking hours will, by extra muscular effort and by keeping the nose and throat clear of mucus, be able to get in enough air through the nose; but at night, when these voluntary processes are in abeyance, the child uses both nose and mouth, and this means snoring. It means, as a rule, disturbed sleep, too. The small amount of oxygen gives to the subconscious mind an uneasy feeling, producing bad dreams which awaken the child with "night terrors." As the masses of adenoid tissue grow or become inflamed, mouth breathing becomes more and more a vital necessity, until the child breathes day and night through the open mouth. Now, with the nose partially or completely discarded as a respiratory tube, and the mouth having taken up this work, it becomes necessary that the mouth cavity be enlarged. This enlargement takes place by the roof of the mouth bulging upward into the now useless nasal cavity. This bend having once started, the constant inward pressure of the strong muscles of mastication accentuates it, causing the high-vaulted palate, the narrow dental arch with its forward protrusion and crowded teeth. These factors combined give us the characteristic adenoid expression;

SNELLEN TEST SHEET, (See Direction pages 24 and 25.)

70 ft. or 21 m

D L N

50 ft. or 15 m.

P T E R

F Z B D E

30 ft. or 9 m.

O F L C T G

20 ft. or 6 m.

A P E O R F D Z

15 ft. or 4.5 m

N P R T V Z B D F H K O

the narrow face, the undeveloped small nostrils, the short upper lip, the absence of normal lines about the mouth, the narrow nose, the drooping inner angle of the eyes, and the high-arched eyebrows.

The voice loses that quality given it by an open pharyngeal vault—resonance. The speech is stuffy; F is substituted for T H, so that "teeth" is pronounced "teef"; G is substituted for N G, so that "song" is pronounced "sogg"; B is substituted for M, and D for N, so that "common" is pronounced "cobbed," and "nose" is pronounced "dose."

Breathing is greatly interfered with, quantitatively and qualitatively. The *quantity* of air admitted is diminished in proportion to the amount of obstruction. If much diminished, there is a partial collapse of the spongy lung tissue. This leaves a vacuum in the chest and the chest walls; the softer part of them along each side of the breastbone becomes depressed, giving us the chest with the prominent breastbone or pigeon breast. The *quality* of the inspired air is altered. Normally, the extensive, convoluted, and turbinated nasal walls, giving a very extensive warm, moist surface, serve to warm the inspired air, and to filter out on their sticky surfaces many of the germs. Not so, when nasal respiration is partially or completely abolished. The air entering the lungs is colder, and, carrying more germs, it makes the adenoid victim very susceptible to colds, grip, pneumonia, tuberculosis, and other air-borne diseases.

Smell is to varying extents destroyed. The inflamed and mucus and pus-covered adenoid tissue at the back of the nose grows forward into the unused nasal cavity. The nasal mucus membrane becomes chronically inflamed and covered with mucus and pus. This means that smell, located in this membrane and dependent upon its healthy condition, is to varying degrees destroyed. You probably recall in this connection your own loss of this sense when you suffered from the ordinary nasal cold. Now, the sense of smell and taste are closely related; the sense of taste is two thirds dependent upon smell. In the brain the centers of smell and taste are next-door neighbors. Recall again the loss of taste in colds. Moreover, taste is an important adjunct to digestion. Appetite, the desire for food, is very dependent upon taste. Science has also demonstrated that the secretion of digestive juices in the stomach is due in part to reflex nervous influences originating in taste. Now, when taste is interfered with, the appetite is poor, less food is taken, and on account of the decrease in amount of digestive juice, what is taken is less well digested. Thus, adenoids interfere with the *ingestion* of *all foods*, gases to the lungs, liquids and solids to the stomach, and with the *digestion* of the solids and liquids. The result is a stunted growth and a decrease in the capacity for all kinds of work. Finally, one of the most important of all the evil effects of adenoids is its interference with *hearing*.

DIAGNOSIS OF ADENOIDS.

The number and distinctiveness of the symptoms vary with the duration and severity of the disease.

The mild cases sleep poorly, snore, and many of them have "night terrors." They are very susceptible to colds and coughs; many are physically and mentally stunted.

The medium cases have all the symptoms of mild cases accentuated, and mouth breathing is usually present during the day. The characteristic expression, already described, is now easily recognized.

The severe cases show all the symptoms described in connection with the disease in a pronounced and easily recognized form.

DEFECTIVE EARS.

The ear is very closely connected with the upper part of the throat or pharynx through the Eustachian tube, a small tube which is about one and a half inches long and one-twelfth of an inch in diameter at its narrowest part. The function of the Eustachian tube is to transmit air from the throat to the middle ear, which is a close box with a chain of small movable bones connecting the outer to the inner wall. Now, sound, as you know, is produced by the waves playing upon and vibrating the outer wall, the vibrations of which are transmitted by the chain of movable bones and the air in the middle ear box to the inner wall, from whence, through nerves, they are carried to the center for hearing in the brain. You will observe that hearing is dependent—among other things—upon the middle ear's containing a normal amount of air and upon the mobility of the chain of small bones. So much for the anatomy and physiology of the ear, that is necessary for you to understand the effect of adenoids upon the sense of hearing.

Adenoids, by reason of their position, tend to grow over or press against the opening of the Eustachian tubes in the throat, and in this way ten to occlude the way through which air enters the middle ear; the air in the middle ear is constantly being absorbed and finally disappears, leaving the middle ear as a more or less complete vacuum, across which the sound waves will not be carried except by the chain of bones. As this chain of movable bones only carry *part* of the waves necessary for hearing, we have defective hearing, partial deafness.

But this is not the only evil influence that the bad neighbor has upon the ear. The adenoid tissue is diseased tissue; it can not kill the many germs that fall upon it from the current of air passing over it; it therefore harbors these germs and is almost constantly covered with infective pus. This infective pus gets into the opening of the Eustachian tube, travels along its walls, and finally finds its way into the cavity of the middle ear. Here it causes an inflammation with an accumulation of pus which causes great tension on the walls of this space; and as there are many sensitive nerves in the wall, these are stretched and pressed upon, causing great pain or earache. The pus may be absorbed; it may invade the cells in the heavy bone just back of the ear, setting up a mastoiditis, a very serious disease. This in turn may rupture into the cavity of the skull, where it causes meningitis and death. This is by no means infrequent. On the other hand, the pus in the heavy mastoid bone behind the ear and in the cavity of the middle ear may rupture the drumhead and drain away through the external ear. No matter in which way the pus escapes—whether it is absorbed, or whether it breaks through the drumhead and gets away—the result is defective hearing, varying in degree from partial to complete deafness.

And now, what does deafness mean to the child? He does not hear the same word pronounced by the teacher that the children with normal ears hear. It sounds differently to him, and when he sees it again, and attempts to pronounce it as he heard it, the teacher scolds him because she thinks he should have remembered a sound he has never heard. The child becomes sensitive to being scolded and laughed at for something that he can not help. He ceases to express opinions except when forced to; he becomes reserved as well as sensitive. He loses faith in himself—and faith is salvation, not only in the next world, but in this world, too. He stops trying. His disposition is spoiled; the undetected physical defect has tainted indelibly his character. You can now readily understand the stupid expression of the adenoid child; because that child can not hear well, he appears inattentive when spoken to.

DIAGNOSIS OF DEFECTIVE EARS.

The child seems inattentive and pronounces incorrectly; often gives a history of earache or discharge from the ear. The "whisper" test, or watch test, proves beyond a doubt both the *existence* and the *degree* of deafness. To apply these tests, see page 22.

DEFECTIVE EYES.

It will be impossible for me to consider as fully as I should like the cause of defective eyes and the optics of defective vision. This matter has been thoroughly considered in a pamphlet I have for distribution. The pamphlet was prepared for teachers by former Secretary Lewis of the State Board of Health. It is a splendid publication and well worthy of your study. It will be sent to you upon request.

Defective eyes that the school teacher should be table to recognize are three: the farsighted or hemitropic eye; the nearsighted or myopic eye, and the astigmatic eye.

The farsighted eye is usually hereditary. The eyeball is too short from before backward. The distant vision is all right; near vision is only possible under strain, and often altogether impossible. Johnnie holds his book as far from him as his arms will permit. After using the eyes for some time, or after using them for a short time in a poor light, he complains often of soreness about the eye-sockets, headache, and dullness. He is tired. On the other hand, he can shoot as well as anybody, because hunting requires distant vision. And because he gets along very well out of school and can shoot well, his parents believe Johnnie is faking about not being able to see. He is punished and scolded by parents and teachers and laughed at by his playmates for being a blockhead, until another character gets a twist in it.

The nearsighted eye is acquired, and 90 per cent of them come on between the ages of six and sixteen years—the school period. This eyeball is too long. There is no distant vision. The child's visual world is narrow, cramped. The child must hold the book very close to see at all. Now, when we read we do not focus our vision on more than a square inch or so of a book or paper—one word is about all our vision is focused upon at one time. That space may be regarded as a large point. Now, the closer we bring the object viewed to the eyes the more the eyes have to be turned in to bring the ball of the eye in line with the visual axis. Therefore, the nearsighted eye must overwork those muscles that pull the eyes in toward the nose. These muscles become extremely tired on long-continued use, and that tired feeling, headache, and nervousness, which occurred in the farsighted eye, make their appearance. Another symptom, frequently present, is double vision, that is, a single word or object appears as *two* words or objects. This symptom is due to the final giving way of one of the muscles that serve to pull the eyes far in toward the nose, which is necessary for vision in the myopic or nearsighted eye. Now, this eye gets worse and worse the longer it is used, and sometimes terminates in complete blindness.

The astigmatic eye is one that has not the normal uniform convexity of the cornea or front transparent part of the eye. Such an eye will see either the perpendicular line or the horizontal line of a plus mark plainly, and the other line dimly or not at all. Or, to put the same fact in another form, an astigmatic eye will see different segments of the circumference of a circle with different degrees of distinctness.

In this way a small "a" and a small "o" look exactly alike. A capital "Q" looks like a large "O." A small "c" and a small "e" may appear identical. The astigmatic eye has poor vision at all distances.

Again, a child is scolded, punished and ridiculed until a sweet disposition is soured and the faith of the child-heart blighted; not because the child could not read the printed page, but because a teacher could not read the book of nature.

DIAGNOSIS OF DEFECTIVE EYES.

All defective eyes have the following *common* symptoms: After varying amounts of study, depending upon the severity of the defect, the eyes begin to burn and ache. The child frequently raises the eyes from the work to open and close them rapidly. Headaches are frequently complained of after long hours of work. After these symptoms have existed for some time indigestion of nervous origin may make its appearance. If the case is not relieved, excessive fatigue and irritability indicate the nervous fatigue and beginning neurasthenia.

In addition to these common symptoms, the symptoms characteristic for one of the three forms of defective vision, farsighted, nearsighted, and astigmatic vision, are present.

The child with farsighted vision holds the book at some distance from the eyes, and has no trouble in reading the Test Card.

The child with nearsighted and astigmatic vision is easily recognized by the test made with the Snellen Test Card.

THE COMMON EFFECT OF DEFECTIVE THROATS, EARS, AND EYES ON CHILDREN.

Enough has been said about the deleterious effect of these physical defects on the child's disposition. The Lord only knows the amount of crime that the school is indirectly responsible for in this way. Besides this common effect of these troubles, there is one other, namely, their relation to nervous exhaustion or neurasthenia, that I desire to bring before you.

Every individual is born with a certain amount of nerve energy or nerve capital. Just as we come into the world with bank accounts of variable size, some large, some small, so are we born with variable amounts of nerve force or nerve capital. Some are born with such enormous funds of nerve capital that the most strenuous life of mental work, together with troubles which would weigh down the average man, leave them mentally strong and free from worry when the other parts of their physical make-up at three score and ten are worn out. Others are not so fortunate. Either their parents have lived intense lives, spending their nervous energies in large amounts and thereby have squandered the nervous force that should have been conserved and transmitted to their offspring, or perhaps the child is born with the average per capita of nerve force.

Now, if we happen to belong to the last two classes, that is, those with an average or less than an average bank account of nerve force—and 95 per cent of us belong to one or the other of these classes—then our parents and teachers must teach us to economically guard our bank of nervous energy against overdraughts which would result in nervous exhaustion or neurasthenia. Stress is the form of draught we make on our nervous capital. By stress we mean all conditions that produce wear and tear of the physical strength, such as time, work, emotional excitement, sickness, and worry. An overdraught of stress will vary according to the amount of nerve force inherited and the previous economy practiced in its use. This "overdraught" results in the disease known as neurasthenia, or nervous exhaustion. This condition is characterized by excessive fatigue and irritability. Its effects are nearly always, to a considerable extent, permanent.

It is hardly necessary for me to say that the extra and unnecessary stress under which the defective pupil labors often brings about neurasthenia by 18 to 25 years, the most frequent age of onset, or renders the nerve account so small that it becomes completely exhausted by 30, 40 or 50 years of age. The irritable, complaining neurasthenic, always too tired to work, is no credit to a school and is a tax on civilization. Many of them find their way to drug habits, insane asylums, or make one of the 20,000 suicides which annually occur in the United States.

Again, the physically defective children are the dull ones. In a New York school 50 bright and 50 dull pupils were selected for examination for physical defects. Of the 50 bright pupils 8 were defective, of the 50 dull ones 43 were defective. Now, these dull pupils hold back the whole school and are a much greater tax to the teacher than the very simple examination necessary for the detection of these troubles, many of which would be remedied if they were known to exist.

EAR TESTS.

The majority of cases of partial deafness and other diseases of the ear found among children can be cured. Ear troubles are often caused by slight affections in the throat or nose that may be easily corrected if treatment is not delayed too long.

It requires no special skill to detect defective hearing, and experience has shown that *examinations by teachers indicate the defects about as well as the tests given by specialists.*

INSTRUCTIONS.

WHISPER TEST.

If a pupil fails to hear an ordinary voice, as in a conversational tone, *at a distance of twenty feet*, an examination should be given to determine the degree of deafness. Proceed as follows:

Select any six, eight or ten pupils and have them stand as if on the circumference of a circle of which the teacher, whom they face, is the center. Require them to stop one ear and then the other with the hand, all the while keeping their *eyes closed*, as the teacher whispers a word or sentence, such as "If good health brings happiness, you and I must have both." Vary the words and sentences to prevent memorizing.

In this way find out the farthest distance in feet at which the majority of the pupils can understand the whispers. Each pupil must be called away from the others to tell what was heard, so they may not hear the report given.

This distance we shall call that for the normal ear.

Now test all pupils separately. Find out the distance at which the *same whispered words and sentences* can be understood *under the same conditions.*

The first distance you will use as the numerator of a fraction for every pupil examined, and the distance at which *each* particular pupil understands will be the denominator. For example, if 10 feet is the distance at which most of the pupils heard the whispers, and 5 feet or 2 feet is the distance at which a particular pupil hears them, the test will be indicated thus, $\frac{10}{5}$, or $\frac{10}{2}$.

From this record the teacher will be able to tell whether or not the pupil ought to have the attention of a physician.

Does the pupil complain of ear ache from time to time? Does matter (pus) or a foul odor come from either ear? Or is the pupil a mouth-breather? If so, do not fail to take proper notice of the condition.

THE WATCH TEST.

The simplest test and the one most generally applied by teachers is made with a watch. Let the child stand or sit, back to examiner, with closed eyes. The examiner holds a watch, first on one side of child's head, then on the other, changing positions on each side to find the distance where the tick of the watch can be heard, and also changing from side to side several times, and asking, "Do you hear the watch?" "Which side is it on?" "Do you hear it now?" etc. Care must be taken not to let the child know when the position of the watch is changed.

All watches have not the same sound; some are louder than others and can be heard at a greater distance. It is easy, however, with the same watch to find out the average distance at which it can be heard. This distance we may call the normal distance, and it will serve as a standard by which to be guided in making tests.

NOTIFY PARENTS AND GUARDIANS.

If it appears from examination that a pupil needs the attention of the family physician or a specialist, the teacher should not hesitate to notify the parents or guardian. There is nothing obligatory in the nature of the Warning Cards. They do not require anything. They simply give warning that a probable disease exists, thus placing the responsibility where it belongs. Those in charge of the pupil are at liberty to take notice of the warning or not, as they may see fit.

If proper attention does not follow the notices sent by the teacher, nevertheless it is the teacher's duty to endeavor from time to time to convince parents and guardians of the advisability of professional counsel for every pupil that appears to need it.

County superintendents will provide you with warning cards.

TO TEST THE STRENGTH OF THE EYESIGHT.

INSTRUCTIONS.

With pins or tacks fasten the open bulletin flat against a wall in a good clear light (a soft side light is best), so that this Test Sheet of letters will hang on a level with the head of the child to be examined, *seated twenty feet from the letters.* Fasten the bottom of the Test Sheet to the wall with pins or tacks to make it as smooth as possible.

Cover one eye with a card held firmly against the nose, taking care not to press on the covered eye with the board. Have the child read aloud the smallest letters he can on the card, from *left to right.* Record the result.

This eyesight test can not, of course, be given to children till they have learned their letters.

[NOTE.—Be sure to fold the Test Sheet, when not in use, and place the bulletin away for safe keeping. Do not allow the sheet to become soiled or the letters damaged in any way. In case they do, make request for another bulletin.]

TO TEST THE ACUTENESS OF THE EYESIGHT.

INSTRUCTIONS.

The number over each line of the test letters shows the distance in feet at which a normal eye *ought to* read the letters. The lines on the card are numbered from bottom to top 15, 20, 30, 40, etc., feet. The average normal eye should read the letters on the 20-foot line at a distance of 20 feet. If this can be done correctly, or with mistake in only one or two letters, the vision may be noted $\frac{20}{20}$, or normal. The numerator of the fraction is the distance in feet at which the letters are read (every child being examined in the seat 20 feet away), and the denominator is the number over the smallest line of letters read. If the smallest letters that can be read are on the 30-foot line, the vision will be noted $\frac{20}{30}$; if the letters on the 40-foot line are the smallest that can be read, the record will be $\frac{20}{40}$; if the letters on the 50-foot line are the smallest that can be read, the record will be $\frac{20}{50}$, etc.

If the letters on the 50-foot line, for instance, can not be seen at a distance of 20 feet, have the child approach slowly until a distance is found at which they can be seen. If 10 feet is the greatest distance at which they can be read, the record will be $\frac{10}{50}$ ($\frac{1}{5}$ of normal).

Test the second eye by covering the first with a card and proceeding as before. Have the letters read from *right to left.* This is to avoid memorizing. Note the result.

If there is a tendency to memorize the letters, cut a hole in a piece of cardboard large enough to allow only one letter to be seen at a time when placed upon the Test Card. It may be moved about to show the letters out of the regular order. A mistake of two letters on the 20 or the 30-foot lines, and of one letter on the 40 or 50-foot lines, may be allowed.

NOTIFY PARENTS AND GUARDIANS.

Blank notice forms are provided to inform parents or guardians of defective eyes. *If the vision falls below $\frac{20}{30}$ in either eye, be sure to send notice promptly.* When the vision is $\frac{20}{20}$ in one eye and $\frac{20}{30}$ in the other, no notice will be sent.

If the teacher finds that the eyes or eyelids are habitually red or inflamed, notice should be sent; or when a child repeatedly complains of pain in the eyes or head, after reading or writing, especially toward the end of school hours. When the child squints, holds his book at less than one foot from the eyes, scowls and uses his eyes at great effort, or is listless and backward in his work, examine him and find out if there is not some defect of the eyes, and if so, take pains to notify the parent or guardian without fail.

[NOTE.—Blank forms for record of examinations are provided for teachers. At the end of the school term this record will be reported to the county superintendent on special forms for that purpose.]

REFERENCE BOOKS.

CIVICS AND HEALTH. Allen. *Publishers, Ginn & Co., New York*	$1.25
PRIMER OF SANITATION. Ritchie. *Publishers, World Book Company, Yonkers-on-Hudson, New York*	.60
HEALTH STUDIES. Hoag. *Publishers, D. C. Heath & Co., Boston*	.75

All of the above books will be found as entertaining as they are instructive, and this latter quality is so pronounced that it is almost the duty of every teacher who really has the welfare of the child at heart to make frequent use of them. Such books ought to be in every public school in the State. They seem to me to be of as much fundamental importance in education as books of mathematics or any other study.

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